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Suzuki et al.

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(54) **STEP APPARATUS FOR VEHICLE**

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(51) **Int. Cl.**

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E05F 15/06	(2006.01)
E05F 15/14	(2006.01)
E05F 1/16	(2006.01)

(52) **U.S. Cl.**

CPC ... ***B60R 3/02*** (2013.01); *E05F 1/16* (2013.01); *E05F 15/06* (2013.01); *E05F 15/14* (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

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(57) **ABSTRACT**

A step apparatus for a vehicle includes a step panel facing an opening formed at a body of a vehicle and fixed to a step support portion which is provided at the body, the step panel made of resin and securing a moving path of an opening and closing member, the moving path being secured at a void defined between the step panel and the step support portion in a height direction of the vehicle, and a leg member connected to the step panel and configured to extend between the step panel and the step support portion at a predetermined position on the moving path in an open state of the opening and closing member, the leg member moving away from the moving path for clearing the moving path before the opening and closing member reaches the leg member during a closing operation of the opening and closing member.

4 Claims, 5 Drawing Sheets

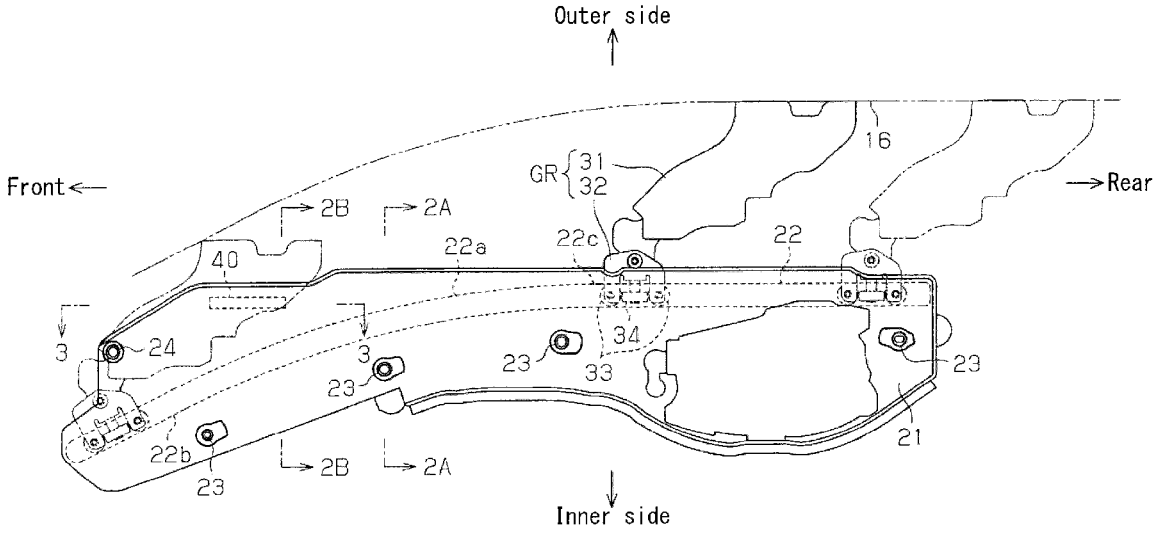


FIG. 1

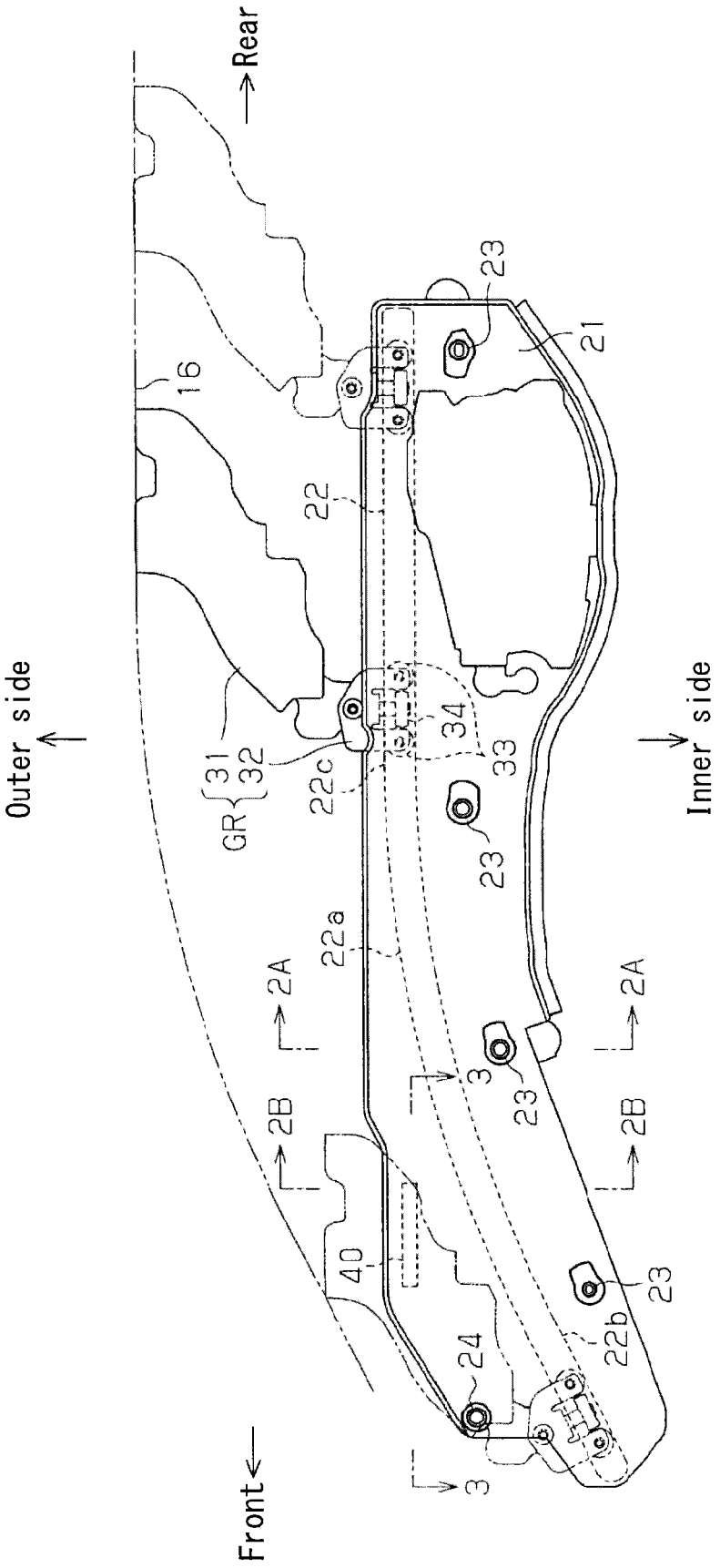

Rear
Front
Outer side
Inner side
16
21
22
22a
22b
22c
23
24
31
32
33
34
40
GR
2A
2B
3

FIG. 2A

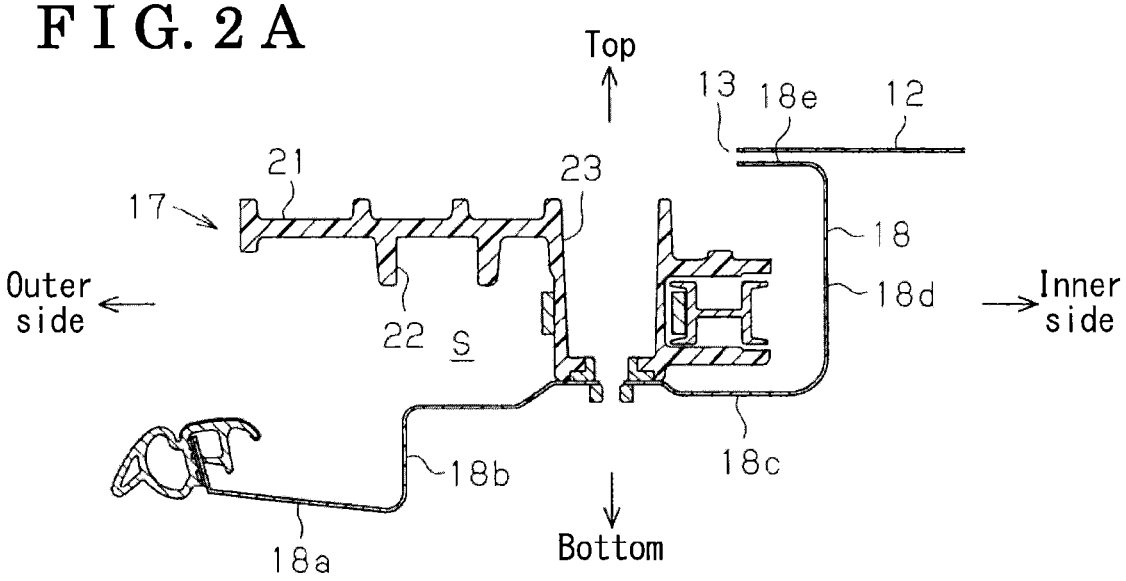


FIG. 2B

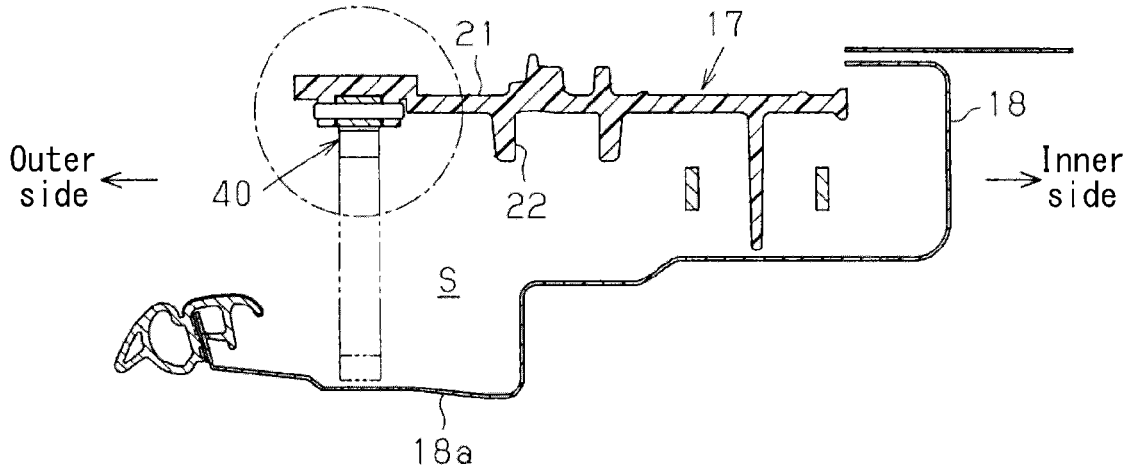


FIG. 2C

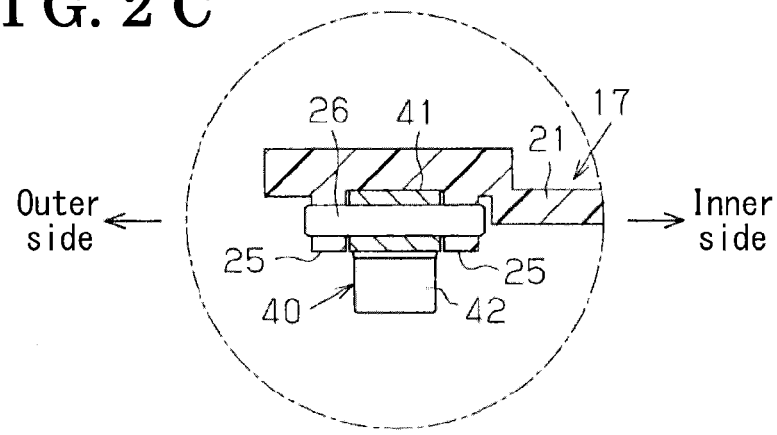


FIG. 3

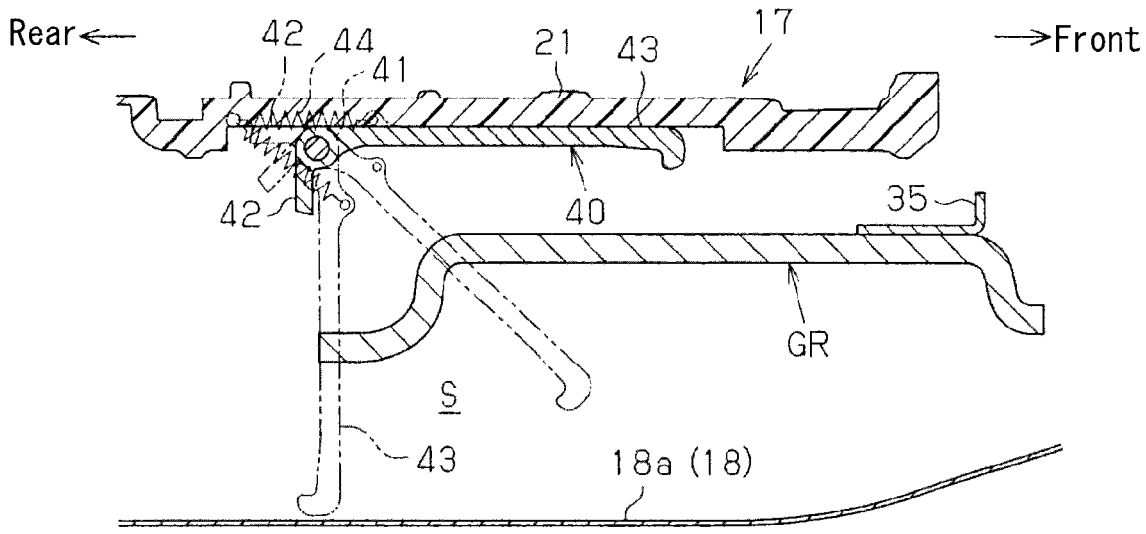


FIG. 4A

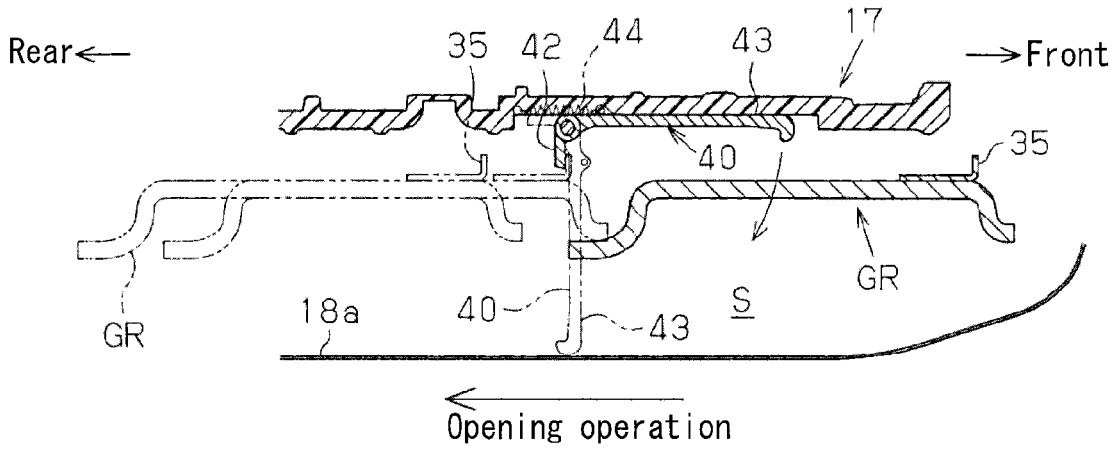

Rear
Front
35
42
44
43
17
40
35
GR
GR
18a
40
43
S
Opening operation

FIG. 4B

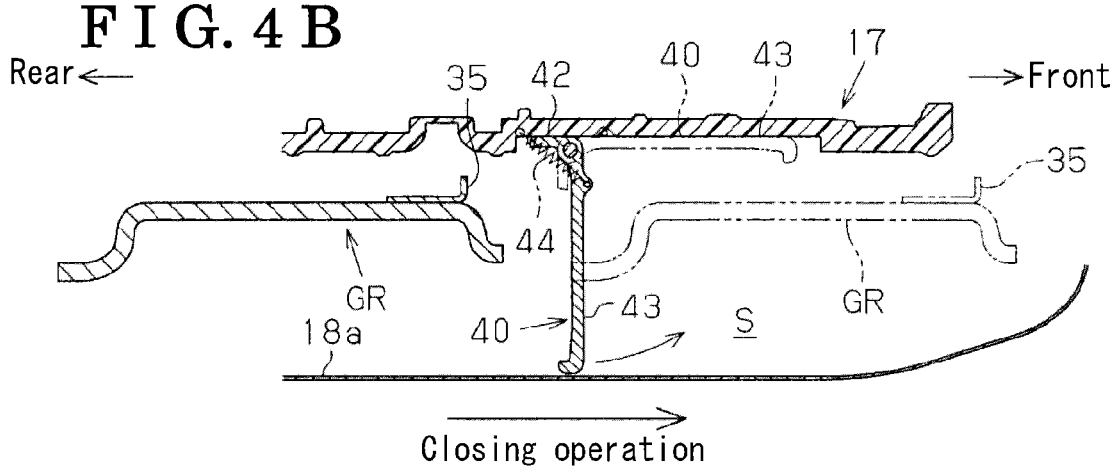
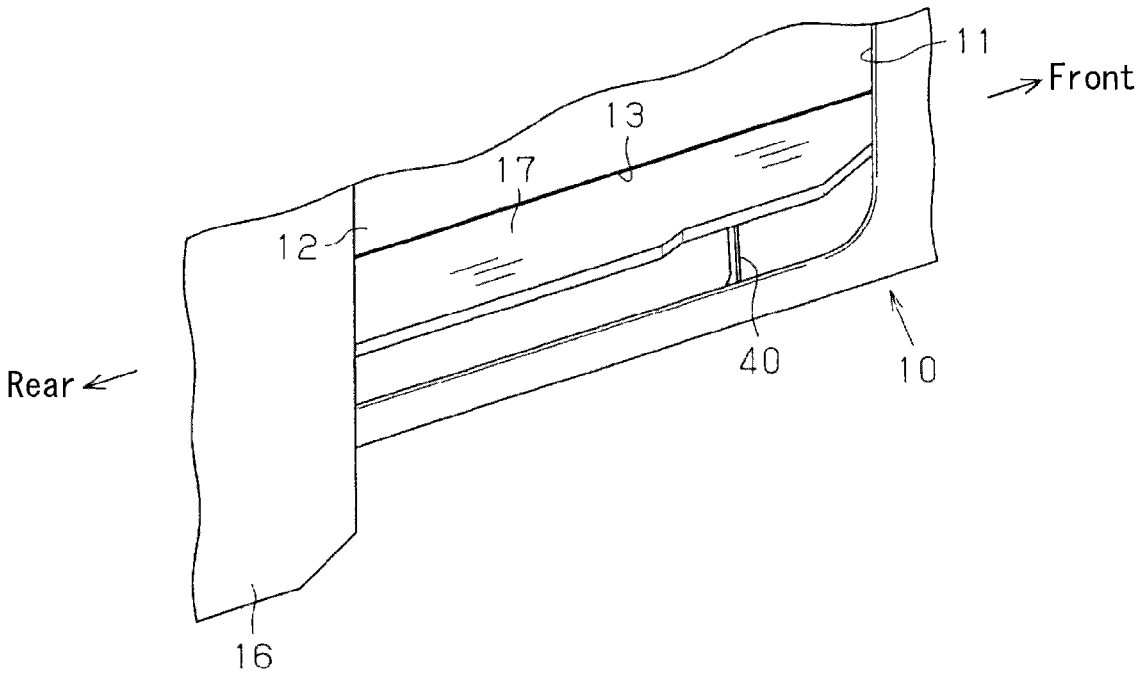

Rear
Front
35
42
40
43
17
35
44
GR
GR
18a
40
43
S
Closing operation

FIG. 5



STEP APPARATUS FOR VEHICLE

CROSS REFERENCE TO RELATED APPLICATIONS

This application is based on and claims priority under 35 U.S.C. §119 to Japanese Patent Application 2014-006667, filed on Jan. 17, 2014, the entire content of which is incorporated herein by reference.

TECHNICAL FIELD

This disclosure generally relates to a step apparatus for a vehicle.

BACKGROUND DISCUSSION

A known step apparatus for a vehicle is disclosed, for example, in JP2011-183834A which will be hereinafter referred to as Reference 1. The step apparatus disclosed in Reference 1 is made of carbon-fiber reinforced plastic. The aforementioned step apparatus includes an outer frame portion which at least partially extends along an outline of a planar form of the step apparatus and a beam portion which is connected to an inner side of the outer frame portion to extend from a vehicle inner side to a vehicle outer side. Each of the outer frame portion and the beam portion includes a substantially C-shape cross section. The step apparatus further includes a guide rail which is integrally formed for guiding a slide door in an opening and closing direction thereof. Accordingly, the step apparatus may be reduced in weight by 50% as compared to a case where the apparatus is made of steel while ensuring rigidity and strength substantially equal to steel.

A further reduction in weight is still desired for the step apparatus disclosed in Reference 1. At this time, it is considered to reduce a thickness of the step apparatus entirely or partially and to form a reinforcing rib at a rear side of a portion where strength is required. Nevertheless, an optimization design of such configuration may have limitations. In addition, in the step apparatus, plural attachment bosses are integrally formed at a portion closer to the vehicle inner side so that the step apparatus is mounted to a vehicle body via the attachment bosses. As a result, the step apparatus is fixed to the vehicle body in a cantilever beam manner. Thus, in a case where a user places one's foot to weight on a portion of the step apparatus closer to the vehicle outer side when the user gets in or out of a vehicle, a large load may be applied locally to an end of the portion fixed to the vehicle body in the cantilever beam manner. In order to overcome the foregoing drawback, a large reinforcement may be desired at the aforementioned portion, however, the large reinforcement is a trade-off from the weight reduction.

A need thus exists for a step apparatus for a vehicle which is not susceptible to the drawback mentioned above.

SUMMARY

According to an aspect of this disclosure, a step apparatus for a vehicle includes a step panel facing an opening formed at a body of a vehicle and fixed to a step support portion which is provided at the body, the step panel made of resin and securing a moving path of an opening and closing member that is configured to open and close the opening, the moving path being secured at a void defined between the step panel and the step support portion in a height direction of the vehicle, and a leg member connected to the step panel and configured to extend between the step panel and the step support portion at a predetermined position on the moving path in an open state of the opening and closing member, the leg member moving away from the moving path for clearing the moving path before the opening and closing member reaches the leg member during a closing operation of the opening and closing member.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and additional features and characteristics of this disclosure will become more apparent from the following detailed description considered with the reference to the accompanying drawings, wherein:

FIG. **1** is a plan view of a step apparatus for a vehicle according to an embodiment disclosed here;

FIG. **2**A is a cross-sectional view taken along line IIA-IIA in FIG. **1**;

FIG. **2**B is a cross-sectional view taken along line IIB-IIB in FIG. **1**;

FIG. **2**C is an enlarged view of a portion of the step apparatus illustrated in FIG. **2**B;

FIG. **3** is a cross-sectional view taken along line III-III in FIG. **1**;

FIG. **4**A is a cross-sectional view illustrating a retracted state of a leg member;

FIG. **4**B is a cross-sectional view illustrating a standing state of the leg member; and

FIG. **5** is a perspective view of a vehicle at which the step apparatus according to the embodiment is mounted.

DETAILED DESCRIPTION

An embodiment will be explained with reference to the attached drawings. In the following, a front-rear direction corresponds to a vehicle front-rear direction, and an upper side (i.e., a top) and a lower side (i.e., a bottom) correspond to an upper side and a lower side in a vehicle height direction respectively. Further, a vehicle inner side and a vehicle outer side correspond to an inner side in a vehicle width direction towards a vehicle cabin and an outer side in the vehicle width direction away from the vehicle cabin respectively.

As illustrated in FIG. **5**, an opening **11** through which a passenger gets in and out of a vehicle is formed at a body **10** for the vehicle. A slide door **16** serving as an opening and closing member for opening and closing the opening **11** is supported at the body **10** to be movable in the front-rear direction. In addition, a recess portion **13** is formed at a floor **12** for the vehicle so as to face the opening **11**. A step panel **17** functioning as a step when a passenger gets in and out of the vehicle is mounted to the recess portion **13**.

As illustrated in FIG. **1**, the step panel **17** made of resin material, for example, includes a body portion **21** formed substantially in a plate form extending in the front-rear direction, and a lower rail **22** serving as a guide rail protruding downward (i.e., at a back side orthogonal to a paper on which FIG. **1** is drawn) from a portion of the body portion **21** at the vehicle outer side. The lower rail **22** includes a curved portion **22***a*, a curved inclination portion **22***b* and a linear portion **22***c*. The curved portion **22***a* is formed at a substantially intermediate portion in a longitudinal direction of the lower rail **22**. The curved inclination portion **22***b* formed at a front side of the curved portion **22***a* is inclined to the vehicle inner side towards the front direction. The linear portion **22***c* formed at a rear side of the curved portion **22***a* extends rearward. Thus, a front end portion of the body portion **21** at the vehicle outer side relative to the lower rail **22** is elongated in a width

direction of the vehicle by an amount corresponding to the inclination of the curved inclination portion **22***b* as compared to a rear end portion of the body portion **21** at the vehicle outer side relative to the lower rail **22**.

The step panel **17** includes plural attachment portions **23** extending downward from the body portion **21** so that the attachment portions **23** are positioned adjacent to the lower rail **22** at the vehicle inner side. In addition, the step panel **17** includes an attachment portion **24** extending downward from the body portion **21** so that the attachment portion **24** is positioned at a front side of the lower rail **22** to be adjacent thereto at the vehicle outer side. The plural attachment portions **23** are disposed to be spaced away in the front-rear direction substantially along the lower rail **22**.

As illustrated in FIG. **2**A, each of the attachment portions **23** is formed in a substantially cylindrical form with a bottom (a bottom wall), a center line of the cylindrical form extending in the height direction of the vehicle. An under panel **18** serving as a step support portion is fixed to the body **10** so as to conform to the position or arrangement of the recess portion **13** of the floor **12**. The under panel **18**, which is made of a metal plate, for example, includes a first bottom wall **18***a*, a step portion **18***b*, a second bottom wall **18***c*, a vertical wall **18***d*, and a flange **18***e*. The first bottom wall **18***a* is disposed at the vehicle outer side (i.e., facing the vehicle outer side). The step portion **18***b* is connected to an end portion of the first bottom wall **18***a* at the vehicle inner side to extend upward. The second bottom wall **18***c* is connected to an upper end of the step portion **18***b* to extend to the vehicle inner side. The vertical wall **18***d* is connected to an end portion of the second bottom wall **18***c* at the vehicle inner side to extend upward. The flange **18***e* is connected to an upper end of the vertical wall **18***d* to extend to the vehicle outer side. The position of the flange **18***e* in the height direction of the vehicle substantially matches the position of the floor **12** in the height direction of the vehicle.

The step panel **17** is fastened and fixed to the under panel **18** by means of fastening members such as bolts, clips, or the like, for example, which penetrate through the second bottom wall **18***c* and bottom walls of the respective attachment portions **23** mounted to the second bottom wall **18***c*. An end of the flange **18***e* at the vehicle outer side is positioned at the vehicle inner side relative to the attachment portions **23**. Thus, an upper side of each of the attachment portions **23** is opened and cleared. In addition, a portion of the body portion **21** at the vehicle outer side relative to the attachment portions **23** forms a void S along with the under panel **18**. The void S extends in the height direction of the vehicle by an amount corresponding to a height of each of the attachment portions **23**. In the void S, a portion at the vehicle outer side is enlarged in the height direction of the vehicle relative to a portion at the vehicle inner side by an amount corresponding to a height of the step portion **18***b*. The lower rail **22** is positioned at an upper side of a portion of the second bottom wall **18***c* at the vehicle outer side relative to the attachment portions **23**. That is, a portion of the step panel **17** including the lower rail **22** at the vehicle outer side relative to the attachment portions **23** is supported at the under panel **18** in a cantilever manner. The front end portion of the body portion **21** at the vehicle outer side relative to the lower rail **22** is elongated in the width direction of the vehicle as compared to the rear end portion of the body portion **21** at the vehicle outer side relative to the lower rail **22**, which leads to an increase of a degree of cantilever.

The attachment portion **24** basically includes the same configuration as the attachment portion **23** except that an arrangement relationship relative to the lower rail **22** is opposite from the attachment portion **23**. The attachment portion **24** is provided to increase support strength of the front end portion of the body portion **21** that is elongated in the width direction of the vehicle.

As illustrated in FIG. **1**, a door-side bracket **31** made of a metal plate, for example, and formed in a substantially arm form is fixed to the slide door **16**. A guide roller **32** is connected to a distal end portion of the door-side bracket **31** to be rotatable about an axis line that extends in the height direction of the vehicle. The door-side bracket **31** and the guide roller **32** constitute a guide roller unit GR. The guide roller **32** includes a pair of (i.e., front and rear) horizontal rollers **33** and a road roller **34**. Each of the horizontal rollers **33** is rotatable about an axis line that extends in the height direction of the vehicle. The road roller **34** is interposed between the horizontal rollers **33** in the front-rear direction to be rotatable about an axis line that extends substantially in a horizontal direction orthogonal to an extending direction of the lower rail **22**. The guide roller **32** guides the slide door **16** to move along the lower rail **22** in a state where the horizontal rollers **33** are mounted to the lower rail **22** in a rolling manner. In addition, the guide roller **32** supports a load of the slide door **16** in a state where the road roller **34** is mounted on the second bottom wall **18***c* in a rolling manner.

In a state where the slide door **16** performs an opening and closing operation, the guide roller unit GR (the door-side bracket **31** and the guide roller **32**) moves within the void S. That is, because of the void S, a moving path of the guide roller unit GR is secured or cleared. Although the attachment portion **24** (i.e., a third portion) is positioned at the vehicle outer side relative to the lower rail **22**, the guide roller unit GR increases a rotation amount of the guide roller **32** relative to the door-side bracket **31** towards the front side so as to avoid an interference with the attachment portion **24**.

A leg member **40** in a substantially column form is connected to a lower portion of the step panel **17** to be rotatable about an axis line that extends in the width direction of the vehicle. The leg member **40** is positioned at the vehicle outer side of a portion defined between the two adjacent attachment portions **23** (i.e., first and second portions). The two adjacent attachment portions **23** are disposed to face each other in the front-rear direction at the front end portion of the step panel **17**. As illustrated in FIGS. **2**B and **2**C, the step panel **17** includes a pair of support walls **25** extending downward from the body portion **21** and facing each other in the width direction of the vehicle. Then, opposed end portions of a substantially columnar support shaft **26** of which a center line extends in the width direction of the vehicle are fitted in and supported at the respective support walls **25**. The leg member **40** includes a substantially cylindrical supported portion **41** of which a center line extends in the width direction of the vehicle and which is disposed between the support walls **25**. The leg member **40** is connected to the support shaft **26** to be rotatable thereabout in a state where the support shaft **26** is fitted in the supported portion **41** between the support walls **25**.

As illustrated in FIG. **3**, the leg member **40** includes a first pressed portion **42** and a second pressed portion **43** extending from the supported portion **41** in a radial direction with reference to the supported portion **41** so that the first pressed portion **42** and the second pressed portion **43** are orthogonal to each other. A length of the first pressed portion **42** is specified to be shorter than a length of the second pressed portion **43**. The rotation of the leg member **40** is restricted within a range that is defined from a state where the second pressed portion **43** makes contact with a lower surface of the body portion **21** at a front side of the supported portion **41** to

a state where the first pressed portion **42** makes contact with the lower surface of the body portion **21** at a rear side of the supported portion **41**.

In a state where the second pressed portion **43** is in contact with the lower surface of the body portion **21**, i.e., in a state where the leg member **40** is in a retracted state, the first pressed portion **42** extends downward and a distal end portion thereof overlaps, in the height direction of the vehicle, an upper end portion of a pressing portion **35** provided at a front end of the guide roller unit GR and including a substantially L-form. On the other hand, in a state where the first pressed portion **42** is in contact with the lower surface of the body portion **21**, i.e., in a state where the leg member **40** is in a standing state (i.e., an uprising or deployed state), the second pressed portion **43** extends downward and a distal end portion thereof makes contact or comes closer to an upper surface of the first bottom wall **18***a* of the under panel **18**. The second pressed portion **43** overlaps the guide roller unit GR in the height direction of the vehicle.

A tensile coil spring **44** serving as a biasing member is disposed between the body portion **21** and the second pressed portion **43** in a state where respective ends of the tensile coil spring **44** engage with the body portion **21** and the second pressed portion **43**. The tensile coil spring **44** functions to selectively hold the aforementioned two states (the retracted state and the standing state) of the leg member **40**. Specifically, the tensile coil spring **44** is arranged to be most expanded at a predetermined rotation position halfway between the two states and is arranged to be gradually contracted when rotating towards any of the two states. That is, the biasing force of the tensile coil spring **44** is specified to gradually decrease in a case where the leg member **40** rotates towards any of the aforementioned two states.

As illustrated in FIG. **4**A, in a case where the slide door **16** is positioned close to a fully closed state (for example, in a substantially fully closed state), the leg member **40** is in the retracted state and the pressing portion **35** of the guide roller unit GR is positioned at the front side of the leg member **40**. Thus, in a case where the guide roller unit GR moves rearward together with the slide door **16** in association with an opening operation of the slide door **16**, the leg member **40** where the distal end portion of the first pressed portion **42** is pressed by the pressing portion **35** rotates in a clockwise direction in FIG. **4**A (i.e., a first direction). Then, the first pressed portion **42** moves away from the moving path of the guide roller unit GR and the second pressed portion **43** is brought to extend between the body portion **21** of the step panel **17** and the first bottom wall **18***a* (for example, to stand on the first bottom wall **18***a* or to be positioned substantially upright relative to the first bottom wall **18***a*). At this time, the tensile coil spring **44** turns over to bias the leg member **40** so that the leg member **40** is shifted to the standing state and to maintain the leg member **40** in the standing state. The guide roller unit GR (the pressing portion **35**) moves and passes through the leg member **40** prior to the rotation of the second pressed portion **43** of the leg member **40** that is in the process of shifting to the standing state. Thus, the rearward movement of the guide roller unit GR is not blocked by the leg member **40**.

On the other hand, in a case where the slide door **16** is positioned close to a fully open state (for example, in a substantially fully open state) as illustrated in FIG. **4**B, the leg member **40** is in the standing state and the guide roller unit GR is positioned at the rear side of the leg member **40**. Thus, in a case where the guide roller unit GR moves forward together with the slide door **16** in association with a closing operation of the slide door **16**, the leg member **40** where the second pressed portion **43** is pressed by the guide roller unit GR rotates in a counterclockwise direction in FIG. **4**B (i.e., a second direction). Then, the second pressed portion **43** moves away from the moving path of the guide roller unit GR and the second pressed portion **43** separates from the first bottom wall **18***a*. At this time, the tensile coil spring **44** turns over to bias the leg member **40** so that the leg member **40** is shifted to the retracted state and to maintain the leg member **40** in the retracted state. The guide roller unit GR moves and passes through the leg member **40** prior to the rotation of the first pressed portion **42** of the leg member **40** that is in the process of shifting to the retracted state. Thus, the forward movement of the guide roller unit GR is not blocked by the leg member **40**. After completion of the shifting of the leg member **40** to the retracted state, the first pressed portion **42** is again positioned on the moving path of the guide roller unit GR.

A function of the embodiment will be explained below. The leg member **40** is arranged to extend between the body portion **21** of the step panel **17** and the first bottom wall **18***a* of the under panel **18**, for example, to stand on the first bottom wall **18***a* or to be positioned substantially upright relative to the first bottom wall **18***a*, at a predetermined position on the moving path of the guide roller unit GR in a state where the slide door **16** is opened. Thus, even when a user places one's foot to weight on the step panel **17** above the void S at the time the user gets in or out of the vehicle, for example, the leg member **40** may support the weight of the user.

According to the embodiment, even when a user places one's foot to weight on the step panel **17** above the void S at the time the user gets in or out of the vehicle, for example, the leg member **40** may support the weight of the user. Thus, while an increase of mass resulting from reinforcement is restrained, the support strength may be enhanced. The leg member **40** moves away from the moving path of the guide roller unit GR for securing the moving path before the slide door **16** reaches the leg member **40** during the closing operation so as not to block the closing operation of the slide door **16**.

In the embodiment, the leg member **40** is pressed by the guide roller unit GR in association with the opening and closing operation of the slide door **16** so as to be automatically operable, which may lead to a simple configuration of the leg member **40**.

In addition, in the embodiment, because the leg member **40** which includes the first pressed portion **42** and the second pressed portion **43** is simply connected to the step panel **17** to be rotatable thereto, the configuration of the leg member **40** may be further simplified.

Further, in the embodiment, the tensile coil spring **44** may selectively maintain the leg member **40** between the retracted state and the standing state, thereby securely maintaining the position or posture of the leg member **40** in each state (i.e., each of the retracted state and the standing state).

Furthermore, in the embodiment, the leg member **40** is disposed at the front end portion of the body portion **21** where the degree of cantilever is greater. Thus, the support strength may further effectively increase. That is, the front end portion of the body portion **21** of the step panel **17** where the degree of cantilever is greater may be supported by the leg member **40** in addition to the two attachment portions **23** (i.e., the first and second portions) provided forward and the attachment portion **24** (i.e., the third portion).

Furthermore, in the embodiment, even in a case where the user places one's foot to weight on the step panel **17** above the void S when the user gets in or out of the vehicle, for example, a load that is locally generated may be dispersed by the leg member **40**.

In the embodiment, instead of the tensile coil spring **44**, a compression coil spring or a torsional coil spring, for example, may be employed. In addition, as long as the position or posture of the leg member **40** in each of the retracted state and the standing state is stabilized, the tensile coil spring **44** may be omitted.

In the embodiment, the position where the leg member **40** is arranged may be appropriately specified as long as the leg member **40** is disposed at the vehicle outer side relative to the attachment portions **23**. In addition, plural leg members **40** may be provided in the embodiment. The positions where the plural leg members **40** are arranged may be appropriately specified as long as the leg members **40** are disposed at the vehicle outer side relative to the attachment portions **23**.

In the embodiment, the lower rail **22** may be formed by an individual and separate member from the step panel **17**. In this case, the lower rail **22** may be disposed at an appropriate position of the body **10**.

In the embodiment, the leg member **40** may be retracted and deployed in the vehicle height direction, for example, so as to be switched between the retracted state and the standing (deployed) state. In addition, the leg member **40** may be electrically switched between the retracted state and the standing state by an electric drive source (motor or the like), for example.

In the embodiment, the term "the second pressed portion **43** extends between the body portion **21** of the step panel **17** and the first bottom wall **18***a*" includes a meaning in which the leg member **40** stands on the first bottom wall **18***a* in a state to be in contact therewith and a meaning in which the leg member **40** is positioned upright or substantially upright relative to the first bottom wall **18***a* in a state to be contactable therewith so that the leg member **40** comes contact with the first bottom wall **18***a* when a user places one's foot to weight on the step panel **17**, for example.

According to the step apparatus of the embodiment, the lower rail **22** (guide rail) is integrally formed at the step panel **17**, and the step panel **17** is fixed to the under panel **18** via two portions (i.e., the first and second portions) at the front end portion of the body portion **21** at the vehicle inner side than the lower rail **22** and via a portion (i.e., the third portion) at the front end portion of the body portion **21** at the vehicle outer side than the lower rail **22**. The leg member **40** is disposed within a range sandwiched and disposed between the aforementioned two portions via which the step panel **17** is fixed to the under panel **18**.

Accordingly, the support strength may be further effectively enhanced.

In the embodiment, while an increase of mass resulting from reinforcement is restrained, the support strength may increase.

According to the embodiment, the void S is configured to secure the moving path of the guide roller unit GR fixed to the slide door **16** and movably mounted to the lower rail **22** which is fixed to the body **10**. The leg member **40** is pressed by the guide roller unit GR in association with the opening operation of the slide door **16** to extend between the step panel **17** and the under panel **18**, the leg member **40** being pressed by the guide roller unit GR in association with the closing operation of the slide door **16** to separate from the under panel **18** for clearing the moving path of the guide roller unit GR.

In addition, according to the embodiment, the leg member **40** is rotatably connected to the step panel **17** by including the first pressed portion **42** and the second pressed portion **43** which are different portions from each other. The leg member **40** rotates in the first direction in a state where the first pressed portion **42** is pressed by the guide roller unit GR in association with the opening operation of the slide door **16** to cause the first pressed portion **42** to move away from the moving path of the guide roller unit GR and to cause the second pressed portion **43** to extend between the step panel **17** and the under panel **18**. The leg member **40** rotates in the second direction in a state where the second pressed portion **43** is pressed by the guide roller unit GR in association with the closing operation of the slide door **16** to cause the second pressed portion **43** to move away from the moving path of the guide roller unit GR and to cause the second pressed portion **43** to separate from the under panel **18**.

Further, according to the embodiment, the step apparatus further includes the tensile coil spring **44** selectively maintaining the state (i.e., the standing state) in which the leg member **40** extends between the step panel **17** and the under panel **18** and the state (i.e., the retracted state) in which the moving path is cleared by the leg member **40**.

Further, according to the embodiment, the lower rail **22** is integrally formed at the step panel **17**. The step panel **17** includes the body portion **21** extending in the front-rear direction of the vehicle, the step panel **17** being fixed to the under panel **18** via first and second portions (the attachment portions **23**) at the front end portion of the body portion **21** in the front-rear direction of the vehicle, the first and the second portions (the attachment portions **23**) being positioned at the vehicle inner side relative to the lower rail **22**, and via the third portion (the attachment portion **24**) at the front end portion of the body portion **21**, the third portion (the attachment portion **24**) being positioned at the vehicle outer side relative to the lower rail **22**. The leg member **40** is arranged within a range defined between the first and second portions (the attachment portions **23**).

The principles, preferred embodiment and mode of operation of the present invention have been described in the foregoing specification. However, the invention which is intended to be protected is not to be construed as limited to the particular embodiments disclosed. Further, the embodiments described herein are to be regarded as illustrative rather than restrictive. Variations and changes may be made by others, and equivalents employed, without departing from the spirit of the present invention. Accordingly, it is expressly intended that all such variations, changes and equivalents which fall within the spirit and scope of the present invention as defined in the claims, be embraced thereby.

The invention claimed is:

1. A step apparatus for a vehicle, comprising:

a step panel facing an opening formed at a body of a vehicle and fixed to a step support portion which is provided at the body, the step panel made of resin and securing a moving path of an opening and closing member that is configured to open and close the opening, the moving path being secured at a void defined between the step panel and the step support portion in a height direction of the vehicle; and

a leg member connected to the step panel and configured to extend between the step panel and the step support portion at a predetermined position on the moving path in an open state of the opening and closing member, the leg member moving away from the moving path for clearing the moving path before the opening and closing member reaches the leg member during a closing operation of the opening and closing member, wherein

the void is configured to secure a moving path of a guide roller unit fixed to the opening and closing member and movably mounted to a guide rail which is fixed to the body,

the leg member is pressed by the guide roller unit in association with an opening operation of the opening and closing member to extend between the step panel and the step support portion, the leg member being pressed by the guide roller unit in association with the closing operation of the opening and closing member to separate from the step support portion for clearing the moving path of the guide roller unit.

2. The step apparatus according to claim **1**, wherein

the leg member is rotatably connected to the step panel by including a first pressed portion and a second pressed portion which are different portions from each other,

the leg member rotates in a first direction in a state where the first pressed portion is pressed by the guide roller unit in association with the opening operation of the opening and closing member to cause the first pressed portion to move away from the moving path of the guide roller unit and to cause the second pressed portion to extend between the step panel and the step support portion,

the leg member rotates in a second direction in a state where the second pressed portion is pressed by the guide roller unit in association with the closing operation of the opening and closing member to cause the second pressed portion to move away from the moving path of the guide roller unit and to cause the second pressed portion to separate from the step support portion.

3. The step apparatus according to claim **1**, further comprising a biasing member selectively maintaining a state in which the leg member extends between the step panel and the step support portion and a state in which the moving path is cleared by the leg member.

4. The step apparatus according to claim **1**, wherein

the guide rail is integrally formed at the step panel,

the step panel includes a body portion extending in a front-rear direction of the vehicle, the step panel being fixed to the step support portion via first and second portions at a front end portion of the body portion in the front-rear direction of the vehicle, the first and the second portions being positioned at a vehicle inner side relative to the guide rail, and via a third portion at the front end portion of the body portion, the third portion being positioned at a vehicle outer side relative to the guide rail,

the leg member is arranged within a range defined between the first and second portions.

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